



Color-coded barriers at Petrobras

Petrobras, the Brazilian national energy corporation, uses BowTies at their Aviation Safety and Competence Department. By using color-coded barriers, the residual risk level of the operation is easily communicated both towards the top management as well as to the operational units when action is needed.

The Aviation Safety and Competence Department within Petrobras E&P Services (SCA) has created BowTies encompassing their aviation strategy, their process-based Aviation Safety Management System (SMS), onshore and offshore aerodromes (helidecks) and the management of contracted aircraft.

"The need to use the BowTie methodology has increased in 2012, due to a greater internal demand for aviation risk analyses," says Fernando Moraes. He is closely involved in implementing BowTies within the organization. "Petrobras wanted to provide greater visibility to the outputs of the risk management process by each accountable manager, particularly to maritime units with helidecks." says Carlos Tinoco, Flight Safety Coordinator at Petrobras. "The BowTie methodology is the state of the art in risk analysis."

Integrating auditing functions

SCA manages a BowTie-based audit program on aviation operations bases and helidecks. "We needed a software tool that would allow us to integrate auditing functions with our BowTie-based risk analyses," Carlos continues, "as well as graphically communicate audit results."

"Since aviation is a very regulated industry, most barriers are already known even before the risk analysis begins. To be helpful as a knowledge management tool, a BowTie software must provide multiple and structured views of the existing data, making it easier to determine the least set of threats required for a given BowTie diagram to contain all the barriers on which our protection relies" Fernando says. "By organizing risk-related information in a BowTie, your risk management efforts should become more efficient."

If the use of the BowTie methodology doesn't enable you to achieve your targeted ALARP faster, with less efforts or less experience, maybe you should review your model or its application."

The organization is positive about the results of using the BowTie methodology in aviation: "We have improved our ability to demonstrate that good safety performance results from a structured approach to risk, not from luck," says Fernando. "Before, we used a lengthy text based safety case, which required much greater effort just to keep it a living document. Also, there has been a shift in our philosophy in how to use the safety case. Previously, every manager should know all the content of the safety case and manage risks accordingly. In such a large organization it seems better to have a small team of specialists to take care of BowTies and the safety case, while managers ensure the integrity of the barriers for which they are accountable. In the end, everyone benefits from improved procedures, where safety information is indistinguishably embedded into operational information". Carlos: "People just want to know what to do. Now it is easier for everyone in the organization to become aware of the weak points. The BowTie methodology makes easier to get the buy-in from all managers, thus ensuring the actions required maintain the integrity of the barriers."

Color-coded BowTies

Presently, every helideck audit report contains a color-coded BowTie, based on a BowTie template for the Top Event "unsafe condition related to offshore aerodrome" and on the audit results. The color for each barrier is defined by pasting the corresponding audit grade in a specific cell in a worksheet view of the BowTie. Fernando: "Although the color-coded BowTies reflect the same information as the text-based audit report, the response tends to be more proactive, since no one likes to own red barriers".

"It is very easy to look at the picture, which enables us to manage risk in the most informed and efficient way," says Carlos. "With such a large operation - 180 helidecks receiving flights from

14 operational bases - it's important to guarantee that we have the barriers in place and that each barrier has been thoroughly assessed. Our top management has confidence that the methodology supports informed decisions about which barriers need priority."

Audits

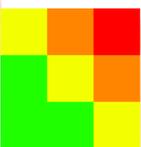
The 2015 helideck audit cycle has begun before the BowTie 'Unsafe condition related to offshore aerodrome' has been validated. Therefore, some adaptation was required to match the existing audit checklists against the barriers in the BowTie, with a 'question to barrier' approach. Aiming at the 2016 audit cycle, the audit checklist was reviewed with a 'barrier to question' approach.

The same process was replicated for onshore aerodromes. Since the key purpose of the aerodrome BowTies is auditing, only barriers that Petrobras is accountable for are represented in those BowTies.

Involving contractors

In 2015 Petrobras has conducted eleven workshops with contracted aircraft operators, in order to develop, with a collaborative approach BowTies for 'Deviation from intended flight path' and 'Release to service of unairworthy aircraft'.

"Our aircraft contractors were invited to invest some time thoroughly considering the very nature of each BowTie element," says Fernando. "For instance, for the classic event 'Deviation from intended flight path', 'incorrect flight planning' is a classic threat. However, during the workshops it became evident that the corresponding barriers were not intended to detect the incorrect flight planning, but to ensure that the flight planning was right in the first time. This means that such threat could be better described as 'the diversity and number of information sources to be processed in order to generate a flight plan'. It is unlikely that we would have such insight without the thorough and collaborative approach used during these workshops."



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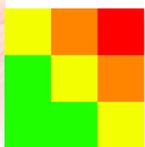
Combining local actions and management views

"A BowTie software must support multiple views, filtering and linking of large amounts of risk management data," says Fernando. "Creating a BowTie is not just about design - you can design a BowTie with PowerPoint if you like - but it is also about how easy it is to shuffle the information across the BowTie diagrams, fine tuning the model and linking management system information, up to a level when it may become a safety case in its own right."

"BowTieXP is a very powerful tool," agrees Carlos. "In the same tool you can combine the top management views, but also the actions that must be taken. Management has an overview of the amount of red barriers, while at the same time the guy on the helideck has the details needed to know exactly what he has to do. Enabling this way of communication throughout the company really makes the difference."

Petrobras is a Brazilian multinational energy corporation headquartered in Rio de Janeiro, Brazil. Petrobras uses BowTieXP, BowTieXL and AuditXP to manage risk in aviation.

BowTieXP is a next generation risk assessment tool that uses the BowTie Method to assess risks. BowTieXP is unique in its ability to visualize complex risks in a way that is understandable, yet also allows for detailed risk based improvement plans. Many global companies have chosen BowTieXP.



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